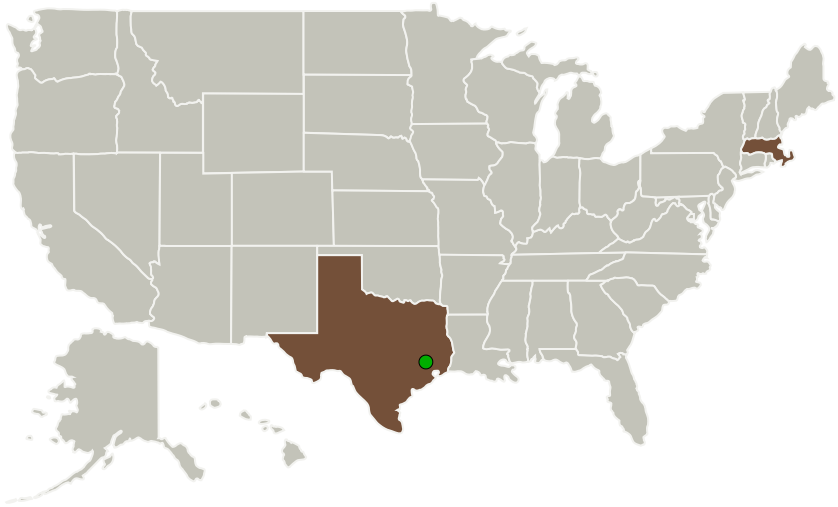
Nanoscale Test Strips for Multiplexed Blood Analysis, Phase II

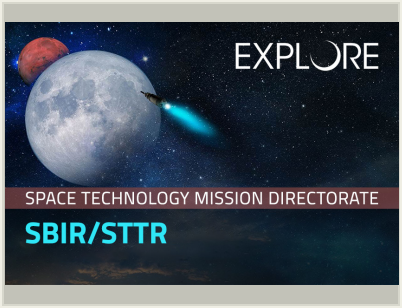
Completed Technology Project (2010 - 2012)

Project Introduction

The goal of our nanoscale test strips, or nanostrips, is to provide rapid, low-cost, powerful multiplexed analyses in a diminutive form so that whole body health checks can be performed on a single drop of blood. The approach is conceptually similar to pH or urinalysis test strips which allow multiplexed measurements in a linear format. The main difference is that we are proposing test strips at the nanoscale, shrunk in size over a billion-fold in volume, allowing multiple sensing elements to be included in a tiny area. In Phase I, we fabricated, tested, and demonstrated functional parathyroid hormone and vitamin D nanostrips for bone metabolism. Furthermore, we developed thrombin aptamer and immune IgG antibody nanostrips. For Phase II, we will develop a breadth of nanostrips designed to address key space-flight medical needs. These will be for assessment of bone metabolism, immune response, cardiac status, liver metabolism, and lipid profiles. We plan to enhance our technology capabilities by developing a Rapid Nanostrip Assay Capability, mix-and-run assay capability, in-house aptamer production, advanced lyophilization technology, and nanostrip accelerated stability tests. The nanostrips will be read out in a time-of-flight flow-based manner utilizing our rHEALTH sensor.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
The DNA Medicine Institute	Lead Organization	Industry	Cambridge, Massachusetts
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Massachusetts	Texas

Project Transitions

January 2010: Project Start

June 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139275)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

The DNA Medicine Institute

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

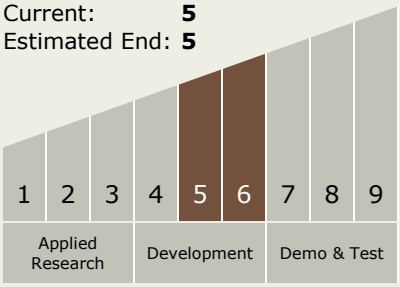
Carlos Torrez

Principal Investigator:

Eugene Y Chan

Technology Maturity (TRL)

Start: **6**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System